

OptiMOS® Power-Transistor
Feature

- N-Channel
- Enhancement mode
- Logic Level
- Low On-Resistance $R_{DS(on)}$
- Excellent Gate Charge x $R_{DS(on)}$ product (FOM)
- Superior thermal resistance
- 175°C operating temperature
- Avalanche rated
- dv/dt rated

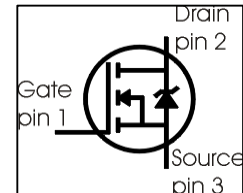
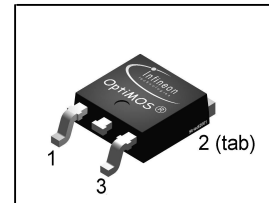


| Type | Package | Marking |
|-----------------|------------|---------|
| SPD30N03S2L-10G | PG-TO252-3 | 2N03L10 |

Product Summary

| | | |
|--------------|----|----|
| V_{DS} | 30 | V |
| $R_{DS(on)}$ | 10 | mΩ |
| I_D | 30 | A |

PG-TO252-3


Maximum Ratings, at $T_j = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Value | Unit |
|--|---------------------|-------------|-------------------|
| Continuous drain current ¹⁾ $T_C=25\text{ °C}$ | I_D | 30 30 | A |
| Pulsed drain current $T_C=25\text{ °C}$ | $I_{D\text{ puls}}$ | 120 | |
| Avalanche energy, single pulse $I_D=30\text{ A}$, $V_{DD}=25\text{ V}$, $R_{GS}=25\text{ Ω}$ | E_{AS} | 150 | mJ |
| Repetitive avalanche energy, limited by $T_{jmax}^{2)}$ | E_{AR} | 10 | |
| Reverse diode $d v/dt$ $I_S=30\text{ A}$, $V_{DS}=24\text{ V}$, $dI/dt=200\text{ A}/\mu\text{s}$, $T_{jmax}=175\text{ °C}$ | dv/dt | 6 | kV/ μs |
| Gate source voltage | V_{GS} | ± 20 | V |
| Power dissipation $T_C=25\text{ °C}$ | P_{tot} | 100 | W |
| Operating and storage temperature | T_j, T_{stg} | -55... +175 | °C |
| IEC climatic category; DIN IEC 68-1 | | 55/175/56 | |

Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|--|------------|--------|------|------|------|
| | | min. | typ. | max. | |
| Characteristics | | | | | |
| Thermal resistance, junction - case | R_{thJC} | - | 1 | 1.5 | K/W |
| Thermal resistance, junction - ambient, leaded | R_{thJA} | - | - | 100 | |
| SMD version, device on PCB: | R_{thJA} | | | | |
| @ min. footprint | | - | - | 75 | |
| @ 6 cm ² cooling area ³⁾ | | - | - | 50 | |

Electrical Characteristics, at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|--|---------------|--------|------|------|------------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| Drain-source breakdown voltage $V_{GS}=0V, I_D=1mA$ | $V_{(BR)DSS}$ | 30 | - | - | V |
| Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=50\mu A$ | $V_{GS(th)}$ | 1.2 | 1.6 | 2 | |
| Zero gate voltage drain current $V_{DS}=30V, V_{GS}=0V, T_j=25^\circ C$ $V_{DS}=30V, V_{GS}=0V, T_j=125^\circ C$ | I_{DSS} | - | 0.01 | 1 | μA |
| | | - | 10 | 100 | |
| Gate-source leakage current $V_{GS}=20V, V_{DS}=0V$ | I_{GSS} | - | 1 | 100 | nA |
| Drain-source on-state resistance $V_{GS}=4.5V, I_D=30A$ | $R_{DS(on)}$ | - | 11.2 | 14.6 | Ω |
| Drain-source on-state resistance $V_{GS}=10V, I_D=30$ | $R_{DS(on)}$ | - | 7.8 | 10 | m Ω |

¹Current limited by bondwire ; with an $R_{thJC} = 1.5K/W$ the chip is able to carry $I_D= 76A$ at $25^\circ C$, for detailed information see app.-note ANPS071E available at www.infineon.com/optimos

²Defined by design. Not subject to production test.

³Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics

| Parameter | Symbol | Conditions | Values | | | Unit |
|-----------|--------|------------|--------|------|------|------|
| | | | min. | typ. | max. | |

Dynamic Characteristics

| | | | | | | |
|------------------------------|--------------|---|------|------|------|----|
| Transconductance | g_{fs} | $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = 30A$ | 23.8 | 47.5 | - | S |
| Input capacitance | C_{iss} | $V_{GS} = 0V$, $V_{DS} = 25V$, $f = 1MHz$ | - | 1160 | 1550 | pF |
| Output capacitance | C_{oss} | | - | 450 | 600 | |
| Reverse transfer capacitance | C_{rss} | | - | 120 | 175 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 15V$, $V_{GS} = 10V$, $I_D = 30A$, $R_G = 5.4\Omega$ | - | 6.1 | 9.2 | ns |
| Rise time | t_r | | - | 13 | 20 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 27 | 41 | |
| Fall time | t_f | | - | 17 | 26 | |

Gate Charge Characteristics

| | | | | | | |
|-----------------------|-----------------|---|---|------|------|----|
| Gate to source charge | Q_{gs} | $V_{DD} = 24V$, $I_D = 30A$ | - | 3.7 | 4.9 | nC |
| Gate to drain charge | Q_{gd} | | - | 10.9 | 16.3 | |
| Gate charge total | Q_g | $V_{DD} = 24V$, $I_D = 30A$, $V_{GS} = 0$ to $10V$ | - | 31.4 | 41.8 | |
| Gate plateau voltage | $V_{(plateau)}$ | $V_{DD} = 24V$, $I_D = 30A$ | - | 3.4 | - | V |

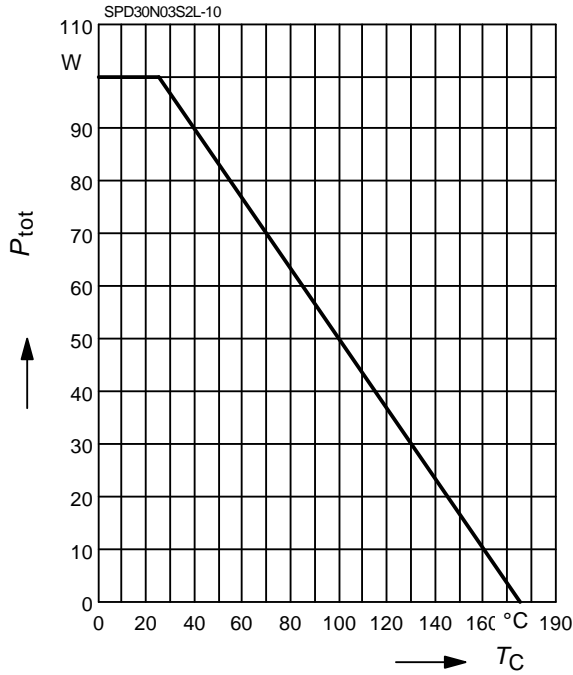
Reverse Diode

| | | | | | | |
|--|----------|--|---|-----|-----|----|
| Inverse diode continuous forward current | I_S | $T_C = 25^\circ C$ | - | - | 30 | A |
| Inv. diode direct current, pulsed | I_{SM} | | - | - | 120 | |
| Inverse diode forward voltage | V_{SD} | $V_{GS} = 0V$, $I_F = 30A$ | - | 0.9 | 1.2 | V |
| Reverse recovery time | t_{rr} | $V_R = -V$, $I_F = I_S$, $di_F/dt = 100A/\mu s$ | - | 31 | 39 | ns |
| Reverse recovery charge | Q_{rr} | | - | 29 | 37 | nC |

1 Power dissipation

$$P_{\text{tot}} = f(T_C)$$

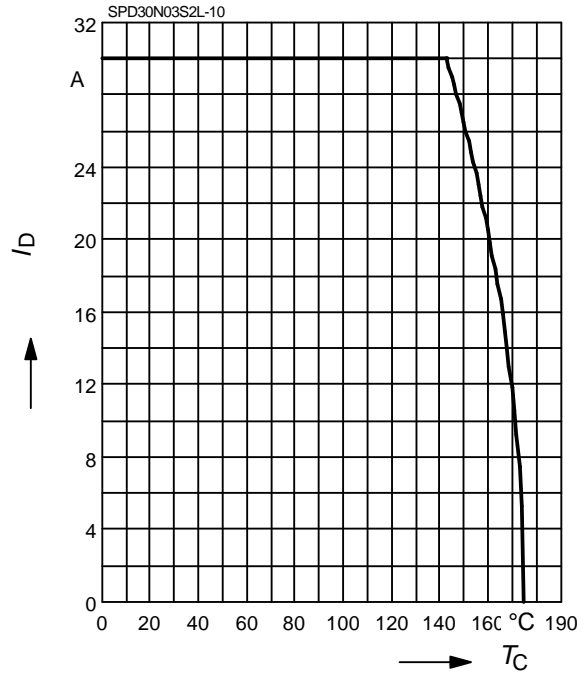
parameter: $V_{GS} \geq 4 \text{ V}$



2 Drain current

$$I_D = f(T_C)$$

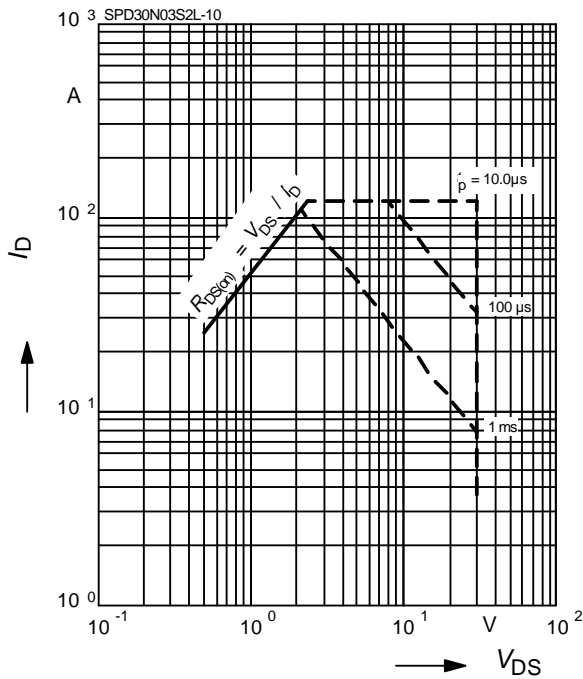
parameter: $V_{GS} \geq 10 \text{ V}$



3 Safe operating area

$$I_D = f(V_{DS})$$

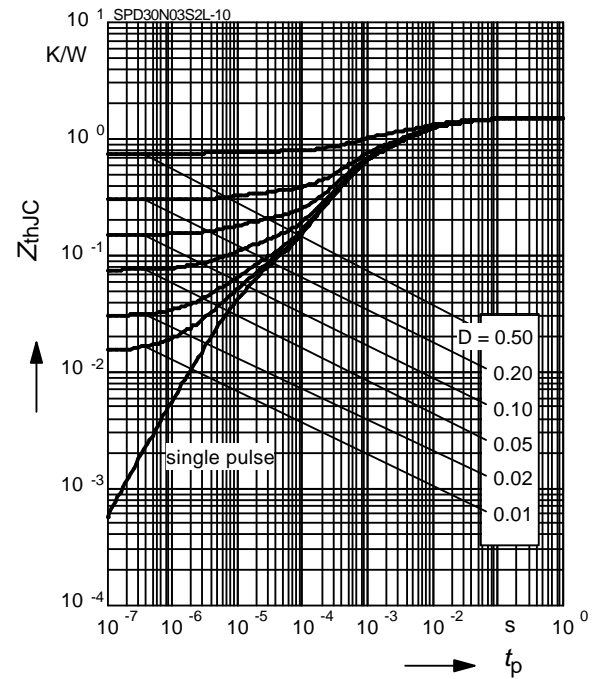
parameter: $D = 0, T_C = 25 \text{ °C}$



4 Max. transient thermal impedance

$$Z_{\text{thJC}} = f(t_p)$$

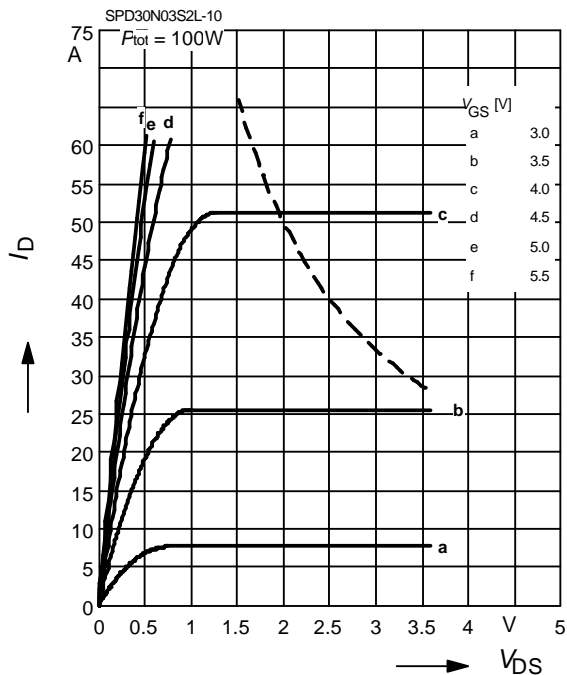
parameter: $D = t_p/T$



5 Typ. output characteristic

$$I_D = f(V_{DS}); T_j = 25^\circ\text{C}$$

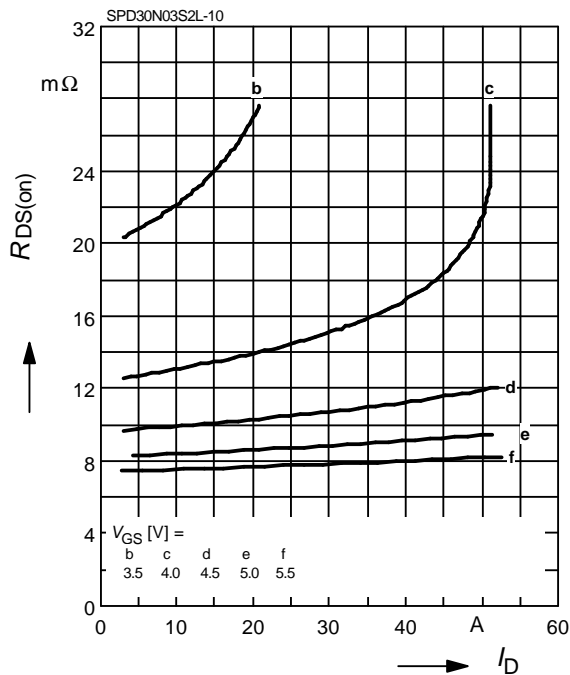
parameter: $t_p = 80 \mu\text{s}$



6 Typ. drain-source on resistance

$$R_{DS(on)} = f(I_D)$$

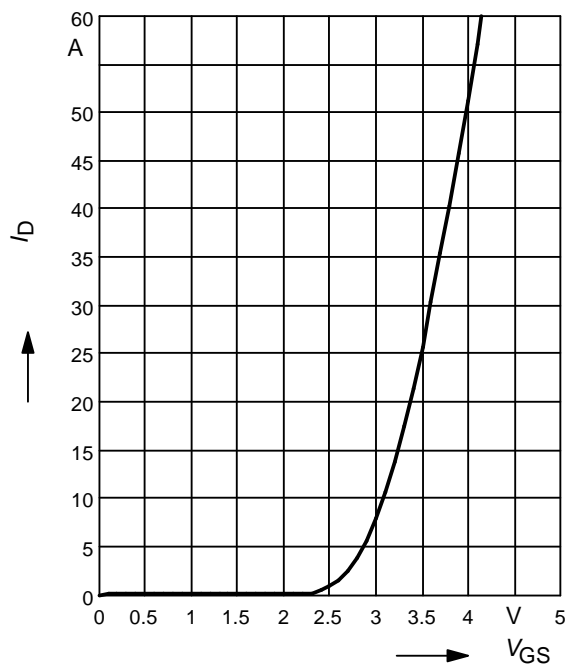
parameter: V_{GS}



7 Typ. transfer characteristics

$$I_D = f(V_{GS}); V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$

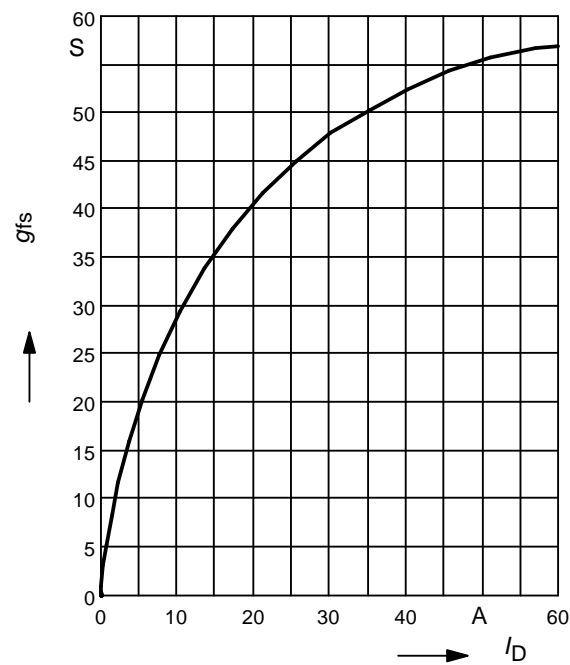
parameter: $t_p = 80 \mu\text{s}$



8 Typ. forward transconductance

$$g_{fs} = f(I_D); T_j = 25^\circ\text{C}$$

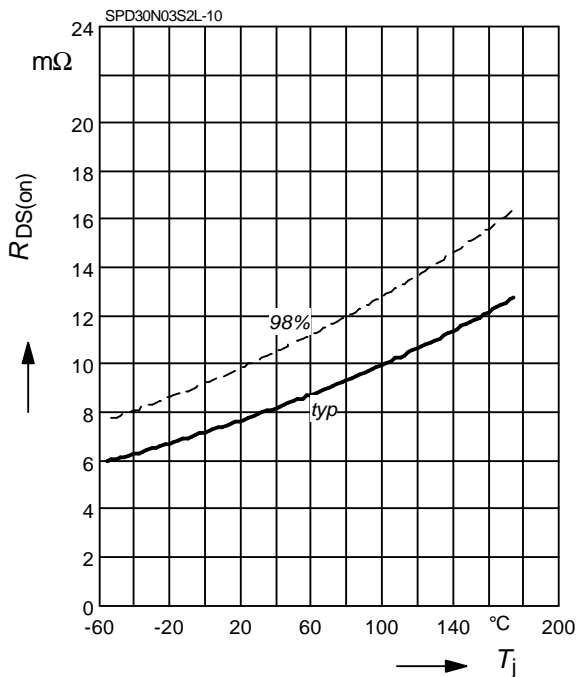
parameter: g_{fs}



9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j)$$

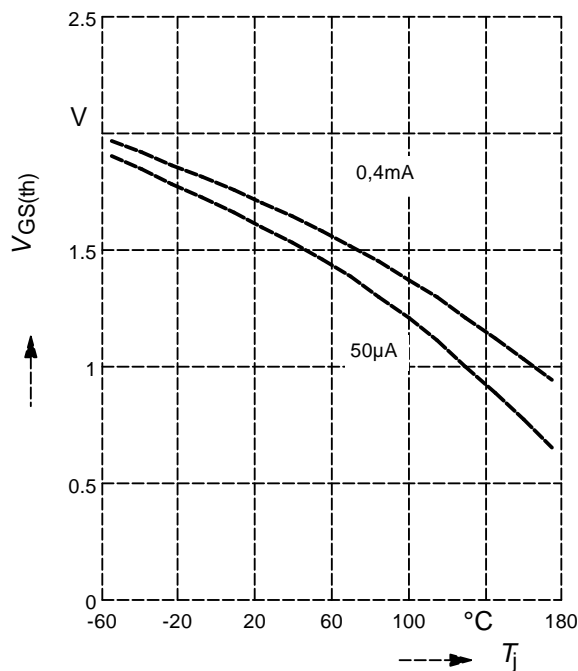
parameter: $I_D = 30$, $V_{GS} = 10$ V



10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j)$$

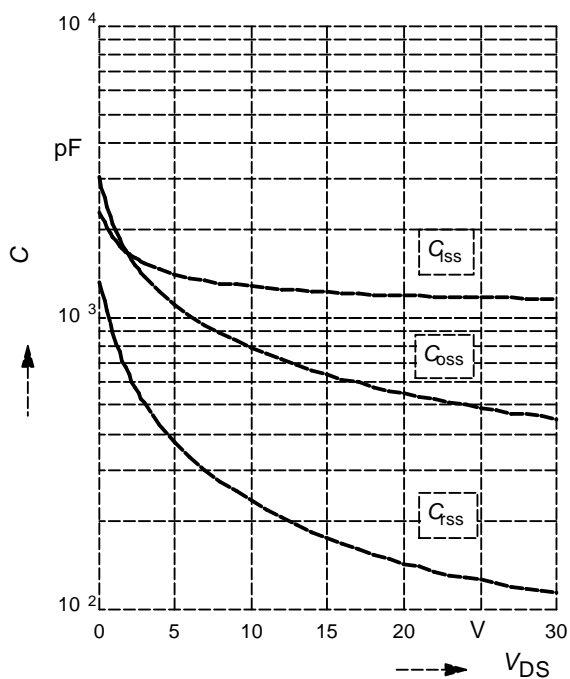
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

$$C = f(V_{DS})$$

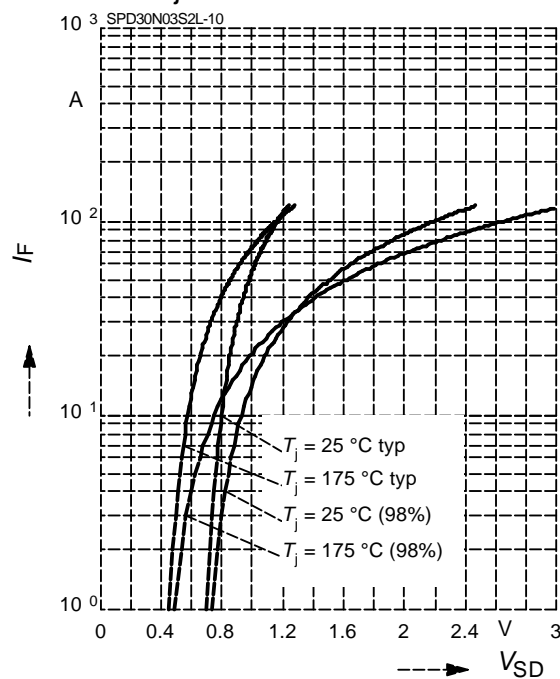
parameter: $V_{GS} = 0$ V, $f = 1$ MHz



12 Forward character. of reverse diode

$$I_F = f(V_{SD})$$

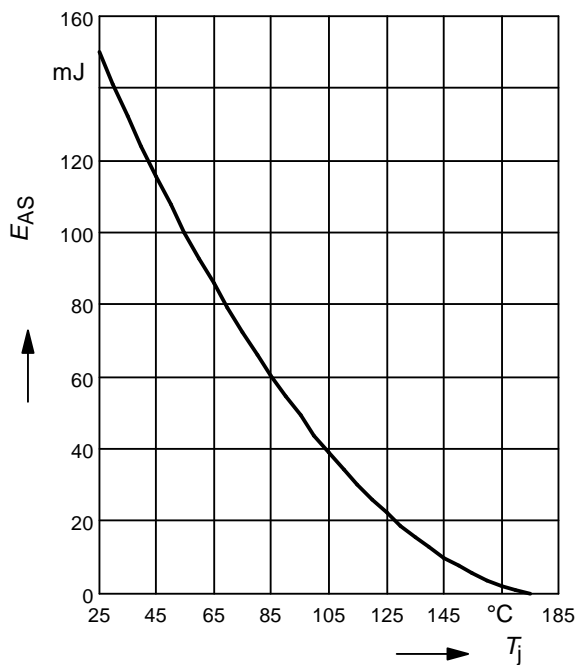
parameter: T_j , $t_p = 80$ µs



13 Typ. avalanche energy

$$E_{AS} = f(T_j)$$

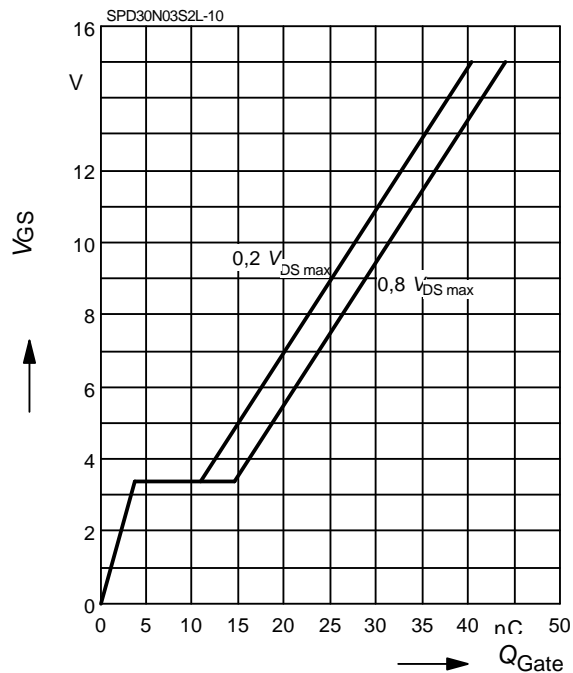
par.: $I_D = 30\text{ A}$, $V_{DD} = 25\text{ V}$, $R_{GS} = 25\ \Omega$



14 Typ. gate charge

$$V_{GS} = f(Q_{Gate})$$

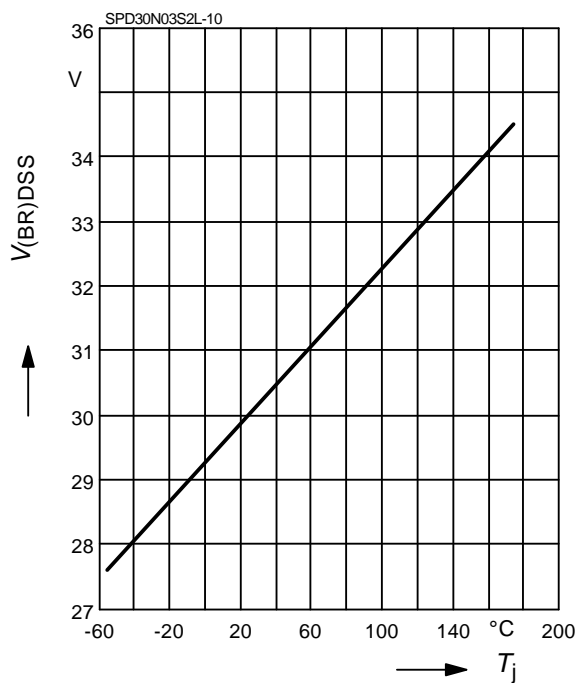
parameter: $I_D = 30\text{ A}$ pulsed



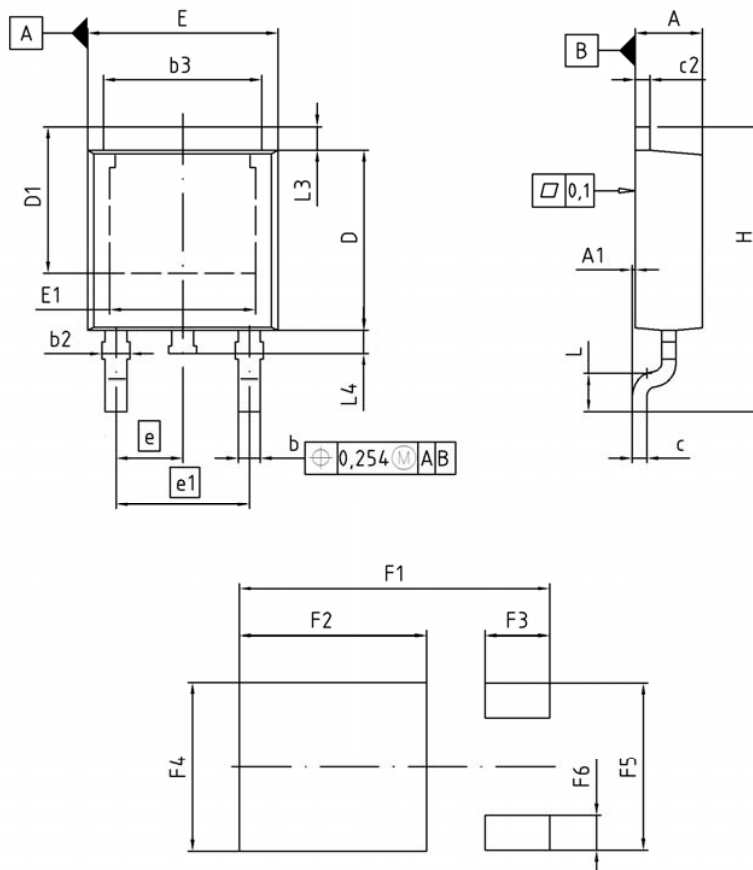
15 Drain-source breakdown voltage

$$V_{(BR)DSS} = f(T_j)$$

parameter: $I_D = 10\text{ mA}$



Package outline: PG-TO252-3



| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 2.16 | 2.41 | 0.085 | 0.095 |
| A1 | 0.00 | 0.15 | 0.000 | 0.006 |
| b | 0.64 | 0.89 | 0.025 | 0.035 |
| b2 | 0.65 | 1.15 | 0.026 | 0.045 |
| b3 | 5.00 | 5.50 | 0.197 | 0.217 |
| c | 0.46 | 0.60 | 0.018 | 0.024 |
| c2 | 0.46 | 0.98 | 0.018 | 0.039 |
| D | 5.97 | 6.22 | 0.235 | 0.245 |
| D1 | 5.02 | 5.84 | 0.198 | 0.230 |
| E | 6.40 | 6.73 | 0.252 | 0.265 |
| E1 | 4.70 | 5.21 | 0.185 | 0.205 |
| e | 2.29 | | 0.090 | |
| e1 | 4.57 | | 0.180 | |
| N | 3 | | 3 | |
| H | 9.40 | 10.48 | 0.370 | 0.413 |
| L | 1.18 | 1.70 | 0.046 | 0.067 |
| L3 | 0.90 | 1.25 | 0.035 | 0.049 |
| L4 | 0.51 | 1.00 | 0.020 | 0.039 |
| F1 | 10.50 | 10.70 | 0.413 | 0.421 |
| F2 | 6.30 | 6.50 | 0.248 | 0.256 |
| F3 | 2.10 | 2.30 | 0.083 | 0.091 |
| F4 | 5.70 | 5.90 | 0.224 | 0.232 |
| F5 | 5.66 | 5.86 | 0.223 | 0.231 |
| F6 | 1.10 | 1.30 | 0.043 | 0.051 |

| |
|-----------------------------|
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